

A'Sharqiyah University

College of Engineering

Department of Electrical Engineering and Computer Science

Bachelor of Technology in Electrical Engineering Program

Course Descriptions

University Requirements (12 CH)

ISLM101 Islamic Civilization (3 CH)

This course aims to introduce students to the concept of civilization, the composition and evolution factors, introduce them to the most important political and administrative systems and economic and social development in the Islamic civilization, and aims to the statement of contributions to Islamic civilization in other civilizations, especially the European civilization, also aims to publicize the importance of the site Oman and how to interact with other previous civilizations in different eras, and the factors that allowed it to be a center of cultural divisions history.

ENGL101 English Communication Skills I (3 CH)

This course develops students' proficiency through grammar instruction and fluency exercises. While the emphasis of the class is on speaking and listening, there are also reading and writing exercises which reinforce the grammar and vocabulary students learn. Finally, students are required to participate in discussions regularly basis and give several presentations.

ENGL102 English Communication Skills II (3 CH) (Pre-R: ENGL101)

This course further develops reading sub-skills, comprehension, and vocabulary. The texts are more demanding lexically and structurally than ENGL101 and are mainly literary. Written and oral activities require students to respond to these texts critically.

MNGT313 Entrepreneurship (3 CH) (Pre-R: 60 CH)

This course is an introductory course in Entrepreneurship and Innovation. The course aims to expose students to business venturing and entrepreneurial activity. The students would apply knowledge and skills acquired during the course by developing and evaluating their business ideas. This course is an introductory entrepreneurship course that focuses on the vital role played by entrepreneurs and entrepreneurship in the 21st-century global economy. The process of successfully launching and growing an entrepreneurial venture by applying the entrepreneurial process is examined. The course integrates several different disciplines, ranging from sociology and psychology to economics, finance,

marketing, and human resource management. It is a course that mixes theory with practice by applying principles, concepts, and frameworks to real-world situations.

College Requirements (21 CH)

ENGR111 Computer Applications (3 CH)

The course teaches students how to use MATLAB and Visual Basic programming languages in a numerical computing and integrated development environment. The topics covered in the course include using variables, solving problems, data analysis functions, manipulating matrices, plotting, data presentation, logical operators, flowcharts, pseudocode, selection structures, and an introduction to Visual Basic programming language with its applications.

PHYS111 Applied Physics (3 CH)

This course provides an understanding of the basic concepts of physics for developing students' understanding in the field of engineering. The topics cover introduction to physics, units, dimensions and significant figures, force, Newton's laws of motion, free body diagrams, applications of Newton's laws, work, power and energy, Archimedes' principle and buoyancy, Pascal's principle, Boyle's law and Bernoulli's principle, wave description and motion, theories of light (particle, wave and EM theories), quantum physics, atomic physics, and nuclear physics.

MATH101 Calculus I (3 CH)

The aim of this course is to lay a firm foundation for students in calculus. The course will introduce students to the concepts of limits, continuity, derivatives, hyperbolic functions and integrals. It will develop mathematic critical thinking and problem-solving skills.

MATH102 Calculus 2 (3 CH) (Pre-R: MATH101)

The aim of this course is to lay a firm foundation for students in calculus. The course will introduce students to the concept's definite integrals, integration by substitution, integration by parts, sequences and series. This course also introduces students to the concepts of vector and scalar product, partial derivatives, solution of first-order ODE's and PDE's.

CHEM111 Applied Chemistry (3 CH)

This course presents the basic concepts and methodologies for understanding chemical phenomena. The covered topics are stoichiometry of chemical reactions, quantum mechanical description of atoms, the elements and periodic table, chemical bonding, real and ideal gases, thermochemistry, introduction to thermodynamics and equilibrium, introduction to chemical kinetics, acid-base and solubility equilibria, introduction to oxidation-reduction reactions, and fundamental concepts of water treatment.

ENGR201 Engineering Drawing (3 CH)

This course provides basic knowledge and skills of engineering drawing so that students can efficiently develop engineering plans and details. Main topics include freehand sketching, principles of orthographic projection, dimensioning, section, isometric and working drawings, 2D and 3D drawings using AutoCAD.

MATH204 Probability and Statistics (3 CH) (Pre-R: MATH102)

Basic concepts of descriptive statistics, statistical inference, regression, correlation analysis, hypotheses test, and confidence intervals, elements of set theory, sample space and events, probability, conditional probability and independence, examples of discrete and continuous probability distributions, multivariate probability distributions, functions of random variables, and central limit theorem.

ENGR322 Summer Internship (0 CH) (Pre-R: 85 CH)

This course is basically focused on practical and project based-training, research and development, communication and development skills, costing and safety awareness, exposure to data collection, troubleshooting, improvement, design and development of systems, and understanding on system operation as whole.

Program Requirements (85 CH)

EETE1021 Digital Systems (4 CH) (Pre-R: MATH101)

The objective of this course is to equip students with the fundamental knowledge and skills required to understand, analyse and design digital circuits. Course topics are various number systems, Boolean logic, Karnaugh mapping, flip flops, counters, combinational, and sequential logic circuits for the real world.

EETE1022 Circuits Theory I (4 CH) (Pre-R: MATH101)

This course introduces the theory and principles for DC and AC circuit analyses. This course introduces concepts of basic laws, circuit analysis techniques, operational amplifiers, capacitors and inductors, transient response of first order circuits, sinusoidal steady-state analysis.

EETE2011 Fundamental of Electronics (4 CH) (Pre-R: EETE1022)

In this course, students will be able to understand the basic knowledge of electronic devices and circuits. The topics include introduction to electronic devices such as diodes, field effect transistors, and bipolar junction transistors, design and analysis of single-stage amplifiers using FETs and BJTs, and hands-on hardware and software (PSpice or NI Multisim) laboratory sessions.

EETE2012 Circuit Theory II (4 CH) (Pre-R: EETE1022)

In this course, we move into the more demanding, realistic, and interesting world of circuits excited by time varying sources (i.e. AC). The topics contain analysis of second order circuits (RLC), AC circuits, AC power, three-phase circuits, magnetically coupled circuits and the advanced electrical circuit analysis using Laplace transformations.

EETE2021 Renewable Energy (4 CH) (Pre-R: EETE1022)

This course discusses and explores current conventional energy resources and then focuses on most common available sources of alternative energy. Topics cover solar, wind, hydro, bioenergy, tidal energy, wave energy, and geothermal energy.

EETE315 Complex Variables and Applications (3 CH) (Pre-R: MATH102)

The aim of this course is to provide the knowledge of complex variables and its engineering applications. This course covers different topics such as complex numbers, limits, continuity and derivatives, Cauchy's theorem, theory of residues, Laplace transform, Fourier transform and series, Taylor and Laurent series, and multivalued functions.

EETE2022 Measurement and Instrumentation (4 CH) (Pre-R: EETE2012)

This course aims to introduce the students to general concepts of measurements and measuring devices. Topics include indicating instruments, measurement of power and energy, measurement of RLC, ac/dc bridges, and magnetic & nonelectrical measurement. The course includes hands-on laboratory sessions.

EETE2023 Electrical Machines I (4 CH) (Pre-R: EETE2012)

In this course, students will be able to understand the concepts of DC electrical machines and transformers. The topics include the rotational motion and magnetic circuits, DC machinery fundamentals: commutation, the internal generated voltage and induced torque, the construction of DC machines, power flow and losses, DC motors and generators: the equivalent circuit, the magnetization curve, the terminal characteristic of a shunt and compounded DC motors, DC motor starters an deficiency, separately excited, shunt, series and cumulatively/ differentially compounded DC generators, transformers: types and construction of transformer, the equivalent circuit, voltage regulation and efficiency, transformer taps and voltage regulation, the autotransformer, three-phase transformers, and three-phase transformation using two transformers. The course includes hands-on hardware and software (MATLAB) laboratory sessions.

EETE2024 Power System I (4 CH) (Pre-R: EETE2012)

In this course, students will be able to understand the fundamentals of electrical power generation, transmission, and distribution. The course discusses the three-phase circuits with delta and star loads, fundamentals of AC power systems such as generation, transmission and distribution of electric power, per unit system, fault calculation, transmission line parameters calculation and study of conductors and cables will be covered as well. The course includes hands-on hardware and software (MATLAB) laboratory sessions.

EETE3011 Power System II (4 CH) (Pre-R: EETE2024)

The course is mainly concerned about power system analysis. In particular, the course provides the general background on power system stability and discusses transient stability, small-signal stability, voltage stability, load flow study, and methods for enhancing stability. The course includes hands-on hardware and software (MATLAB) laboratory sessions.

EETE3012 Electrical Machines II (4 CH) (Pre-R: EETE2023)

This course aims at introducing and analysing electrical AC machines. The topics include the basic concepts of rotating magnetic field in three phase machines, induction Motors: construction, basic concepts, the equivalent circuit, power and torque, torque-speed characteristics, motor design classes, starting induction motors, speed control, solid-state induction motor drives, determining circuit model parameters, induction generators: the induction generator operation principle, and induction generated voltage, the equivalent circuit, the phasor diagram, power and torque, measuring parameters, and parallel operation of AC generators, synchronous motors: basic principles of motor operation, steady-state synchronous motor operation, starting synchronous motors, and single-phase and special-purpose motors. The course includes hands-on hardware and software (MATLAB) laboratory sessions.

EETE4011 Power Electronics (4 CH) (Pre-R: EETE2011)

This course mainly focused on the fundamentals of power electronic devices and their applications. The topics include switch-mode power conversion, power supplies, inverters, motor drives, and power semiconductor devices, system analysis, design, and modelling. The course includes hands-on hardware and software (PSpice or NI Multisim) laboratory sessions.

EETE341 Signals and Systems (3 CH) (Pre-R: MATH102)

This course is mainly concerned about continuous and discrete-time signals, systems, and their properties. Course topics cover convolution sum and convolution integral, system descriptions using differential and difference equations, continuous-time Fourier series, Fourier transform, and their properties, introduction to modulation and sampling, and introduction to Z-transform.

EETE314 Electromagnetic Fields (3 CH) (Pre-R: MATH102, EETE1022)

The aim of this course is to provide the fundamental knowledge of electromagnetic field theory. The topics of this course introduce vector analysis and coordination systems, static electric fields, static magnetic fields, Maxwell's equations, plane waves interacting with boundaries, and transmission lines.

EETE413 Microprocessor and Microcontroller (3 CH) (Pre-R: MATH1021, ENGR111)

This course is concerned with the introduction to microprocessor and microcontroller. The topics include basic computer organization, distinguish between a microprocessor and microcontrollers, 8086 (microprocessor) and AVR328P (microcontroller) architecture, instruction sets, assembly language programming, and interfacing with the peripherals.

ENGR331 Applied Engineering Mathematics (3 CH) (Pre-R: MATH102)

This course aims at applying mathematics to solve engineering problems. The topics include vectors algebra, matrices and applications of linear and nonlinear systems, programming for numerical calculations, round-off error and approximation, solving linear and nonlinear equations, curve fitting and interpolation, numerical differentiation and integration.

EETE415 Power system Protection (3 CH) (Pre-R: EETE2024, EETE3012)

In this course students will gain knowledge about the protection of power system elements. The topics include fault analysis, relay design, and different types of relays, different schemes of relaying, protection for different components of power systems which includes transmission lines, transformers, buses, generators, and motors.

EETE3021 Control Systems (4 CH) (Pre-R: ECEN341)

This course covers the fundamental principles underlying the analysis, design, and optimization of analog communication systems. Topics include concepts of Fourier analysis, random processes, modulation techniques including AM, AM-DSBSC, SSB, VSB and angle modulation techniques including PM and FM.

EETE411 High Voltage Engineering (3 CH) (Pre-R: EETE2024)

The course aims to provide students with knowledge of high voltages. The topics include HVAC/HVDC, high voltage generation, measurment of ac/dc and impulse high voltages, insulation testing and coordination, breakdown phenomenon in gas, liquid and solid insulators, basic theories and principles in relation to network transients, insulation degradation, and operation of modern advanced electrical apparatus.

EETE412 Capstone Design Project I (3 CH) (Pre-R: 85 CH)

This is a first semester of a two-semester graduation project. Students work on projects to solve practical problems in generation, transmission, distribution, utilization, electronics, renewables and instrumentation.

EETE4012 Introduction to Communication systems (4 CH) (Pre-R: ECEN342)

This course introduces basic principles and concepts of communication systems. The course includes the basic elements of communications, signal analysis, amplitude modulation, angle modulations and digital modulations, as well as transmission channels and medium, introductions to signal propagations and calculations of signal to noise ratio. The course includes hands-on laboratory sessions.

EETE421 Industrial Instrumentation (3 CH) (Pre-R: EETE3021)

This course aims to introduce the concepts of industrial instrumentation for nonelectrical quantities. The topic covered are measurement of nonelectrical quantities such as force, acceleration, pressure, temperature, and etc. through different methods.

EETE422 Capstone Design Project II (3 CH) (Pre-R: EETE412)

This is the second semester of a two-semester graduation project. Students work on projects to solve practical problems in electrical, electronics and communications including planning, design, and implementation to meet specifications.

EETE423 Power system operation and Control (3 CH) (Pre-R: EETE3011, EETE3021)

This course provides the students with the principles of modern operation and control of power systems. It covers topics such as economic dispatch, power system security, interchange of power and energy, frequency and voltage control, energy control centers, and state estimation in electrical power systems.

Program Electives (Choose three courses of 9 CH)

EETE416 Electric Distribution (3 CH) (Pre-R: EETE2012)

This course deals with the structure of electrical distribution power systems. The topics covered in this course are short circuit calculation, circuit breakers, overvoltage protection and coordination, grounding, and national cods and standards.

EETE418 Mechatronics (3 CH) (Pre-R: EETE413)

This course introduces mechatronics systems. The topic focused on fundamentals of microcontrollers, analog and digital electronics, sensors, actuators, and their applications to modern mechatronics systems and intelligent manufacturing.

EETE419 Automated Control Systems (3 CH) (Pre-R: EETE3021)

This course provides an overall exposure to the technology of Industrial Automation and Control both for discrete and continuous manufacturing. The course discusses a wide range of topics including architecture of automation systems, measurement systems, PID tuning, PLC'S and Electrical machine drives.

ECEN541 Digital Signal Processing (3 CH) (Pre-R: ECEN341)

In this course, fundamental of digital signal processing is introduced. The topics cover digital signal processing, sampling, z-transform, discrete and fast Fourier transforms, flowgraphs, digital filters, filter Structure, filter approximation, and their applications.

EETE424 Distributed Generation (3 CH) (Pre-R: EETE2024, EETE3021)

This course equips the students with the basics of distribution network modelling, the different types of distributed energy sources utilized (Co-generation/CHP, wind, hydro, photovoltaics) and their integration into electric grid, and their impact on the fundamental operation of the distribution and transmission networks, and operation of market frameworks.

EETE425 Distributed Control Systems (3 CH) (Pre-R: EETE3021)

This course provides an introductory knowledge on programmable logic controller (PLC) and their programming languages. The topics covers applications of PLC, computer-controlled systems (SCADA), architecture and local control unit of distributed control system (DCS) and interfaces used in DCS.

EETE426 Microelectronic Systems (3 CH) (Pre-R: EETE413)

This course teaches the principles of advanced digital design. It demonstrates how digital design and rapid prototyping are facilitated by FPGAs and hardware description languages.

EETE427 Neural Networks and Fuzzy Logic (3 CH) (Pre-R: ENGR331)

The main aim of this course is to expose the students to the concepts of artificial neural network's types, supervised and unsupervised learning, and fuzzy set theory, fuzzy inference system and clustering, and hybrid neuro-fuzzy system

EETE428 Utilization of Electric Energy (3 CH) (Pre-R: EETE2024)

This course aims to introduce the basic concepts of utilization of electrical energy. The course topics cover illumination, electric heating, electric welding, low voltage calculations for electrical wiring, electric traction, and power factor improvement.

EETE429 Smart Grid (3 CH) (Pre-R: EETE2024)

The aim of this course is to provide students with a comprehensive understanding on design and analysis of smart grids. The topics cover the structure and components of smart grids, their communication and measurement system, interoperability, advanced metering system, micro-grid, renewable sources integration, and the applications.

EETE511 Electrical Power Systems Quality (3 CH) (Pre-R: EETE2024)

This course introduces the basic concept of power quality. The course topics include terms and definitions, voltage sag and interruptions, voltage transient, harmonics and their solutions, wiring and grounding, and mentoring, assessment and mitigation of power quality.

EETE512 Power Systems Control and Stability (3 CH) (Pre-R: EETE3011)

This course aims at studying and analysing power system control and stability. The course discusses modelling of power system components, steady-state analysis, response of power networks to small signal disturbances, frequency control modelling and multi-machine modelling. Topics such as voltage stability and transient stability and computer simulations and stability enhancements are covered by this course as well.

EETE514 Power Systems Reliability and Planning (3 CH) (Pre-R: EETE2024)

This course focuses on the fundamental concept of reliability and planning of power systems. The topics cover the generation, transmission, distribution levels, the reflection of the reliability, market demand on system planning, factors that affect system expansion planning, operation and management.

EETE515 Optimization Techniques in Engineering (3 CH) (Pre-R: ENGR331)

The course explores a variety of optimization strategies and tools that can be used to solve engineering problems. The topics include optimization introduction, mathematical modeling, unconstrained optimization, discrete optimization, genetic algorithms, constrained optimization, robust optimization, and dynamic optimization.

EETE516 Digital Control Systems (3 CH) (Pre-R: EETE3021)

This course deals with the introduction to modern digital control system in the state space. Topics include Z-transform as applied to discrete-time systems with transformation from the s-plane to the z-plane, analyses digital control systems using Nyquist and Bode plots and root locus, stability analysis, and design using root-locus and Bode plots, introduction to state-space and pole assignment, finite-word length effects, and MATLAB applications.

ENGR404 Engineering Economics (3 CH) (Pre-R: MATH102)

The objective of this course is to introduce the basic concepts of engineering economy and to demonstrate the importance of financial management and engineering decisions in financial project analysis. The topics covered includes an overview of financial accounting, time-value of money, risk in financial decisions, and book and tax depreciation.

EETE515 Communication Networks (3 CH) (Pre-R: ECEN341)

The goal of this course is to provide a qualitative and quantitative study of the issues in the design, analysis, and operation of computer communication and telecommunication networks. The course covers illustration of the architecture of internet and the OSI-ISO reference model, design application layers' protocols such as HTTP and FTP, compare transport layer protocols (UDP and TCP) and network layer (Routing, IPV4 and IPV6), and assess the issues surrounding mobile and wireless networks.

ECEN543 Wireless Communications (3 CH) (Pre-R: ECEN341)

This course aims to provide the fundamentals of wireless communications. The topics emphasis on wireless channel modelling, digital modulation in wireless channels, diversity techniques, channel coding and interleaving in fading channels, adaptive equalization, multiple access techniques, and overview of current wireless architectures.

OJTR406 Industrial Internship I (3CH) (Pre-R: 85 CH) OJTR407 Industrial Internship II (3 CH) (Pre-R: OJTR406)

This course is an internship course in which students need to spend two semesters in the industry of related fields. This internship course provides ASU's students with the opportunity to obtain experience in a typical work environment. Students will gain exposure to various aspects of general practices along with valuable industry experiences. This process will allow students to apply the theoretical knowledge in a professional work environment. This internship course is also intended to enhance the students' skills, competences, and employment prospects.